

WHAT IS CLAIMED IS:

1. A pixilated scintillator array for a radiation detector of an imaging system, said scintillator array comprising: ✓

a plurality of scintillator pixels arranged side by side in an array, said scintillator pixels separated from adjacent scintillator pixels by gaps, each said scintillator pixel comprising:

a top surface and a plurality of side surfaces;

a first layer covering said top surface and said side surface of each said scintillator pixel, said first layer formed from a smoothing coating;

a second layer covering said first layer, said second layer formed from a reflective metal coating; and

a third layer covering said second layer, said third layer formed from a barrier coating.

2. A scintillator array in accordance with Claim 1 wherein said reflective metal coating comprises at least one of silver, gold and aluminum.

3. A scintillator array in accordance with Claim 1 wherein said smoothing coating has a refractive index less than 1.5.

4. A scintillator array in accordance with Claim 1 wherein said first layer is about 0.5 μm to about 3.0 μm in thickness.

5. A scintillator array in accordance with Claim 4 wherein said first layer is about 1.0 μm to about 2.0 μm in thickness.

6. A scintillator array in accordance with Claim 1 wherein said second layer is about 0.1 μm to about 3.0 μm in thickness.

7. A scintillator array in accordance with Claim 6 wherein said second layer is about 0.5 μm to about 2.0 μm in thickness.

8. A scintillator array in accordance with Claim 1 wherein said third layer is about 0.5 μm to about 15.0 μm in thickness.

9. A scintillator array in accordance with Claim 8 wherein said third layer is about 2.0 μm to about 10.0 μm in thickness.

10. A scintillator array in accordance with Claim 1 further comprising an adhesive material filling said gaps between said scintillator pixels, said adhesive material comprising about 15 weight percent to about 60 weight percent of a filler material comprising at least one of TiO_2 , Ta_2O_5 , Bi_2O_3 , WO_3 , PbO , HfO_2 , and tungsten, the weight percent based on the total weight of the adhesive material.

11. A scintillator array in accordance with Claim 10 wherein said adhesive material comprises about 20 weight percent to about 50 weight percent of the filler material, the weight percent based on the total weight of the adhesive material.

12. A computed tomographic imaging system comprising:

a rotating gantry;

a detector array on said rotating gantry; and

a radiation source on said rotating gantry opposite said detector array and configured to direct a radiation beam through an object towards said detector array;

said detector array comprising a scintillator array optically coupled to a plurality of diodes, said scintillator array comprising:

a plurality of scintillator pixels arranged side by side in an array, said scintillator pixels separated from adjacent scintillator pixels by gaps, each said scintillator pixel comprising:

a top surface and a plurality of side surfaces;

a first layer covering said top surface and said side surface of each said scintillator pixel, said first layer formed from a smoothing coating;

a second layer covering said first layer, said second layer formed from a reflective metal coating; and

a third layer covering said second layer, said third layer formed from a barrier coating.

13. An imaging system in accordance with Claim 12 wherein said reflective metal coating comprises at least one of silver, gold and aluminum.

14. An imaging system in accordance with Claim 12 wherein said smoothing coating has a refractive index less than 1.5.

15. An imaging system in accordance with Claim 12 wherein said first layer is about 1.0 μm to about 2.0 μm in thickness.

16. An imaging system in accordance with Claim 12 wherein said second layer is about 0.5 μm to about 2.0 μm in thickness.

17. An imaging system in accordance with Claim 12 wherein said third layer is about 2.0 μm to about 10.0 μm in thickness.

18. An imaging system in accordance with Claim 12 wherein said scintillator array further comprises an adhesive material filling said gaps between said scintillator pixels, said adhesive material comprising about 20 weight percent to about 50 weight percent of a filler material comprising at least one of TiO_2 , Ta_2O_5 , Bi_2O_3 , WO_3 , PbO , HfO_2 , and tungsten, the weight percent based on the total weight of the adhesive material.

19. A method of making a scintillator array comprising:

providing a pixilated scintillator pack preform comprising a plurality of scintillator pixels arranged side by side in an array and separated by a gap, each pixel having a top surface and a plurality of side surfaces;

applying a smoothing coating on the top surface and the side surface of each scintillator pixel to form a smoothing layer;

applying a reflective metal coating on top of the smoothing layer to form a reflective metal layer; and

applying a barrier coating on top of the reflective metal layer to form a barrier layer.

20. A method in accordance with Claim 19 wherein applying a smoothing coating comprises applying a smoothing coating on the top surface and the side surface of each scintillator pixel to form a smoothing layer of about $1.0 \mu\text{m}$ to about $2.0 \mu\text{m}$ in thickness.

21. A method in accordance with Claim 19 wherein applying a reflective metal coating comprises applying a reflective metal coating on top of the smoothing layer to form a reflective metal layer of about $0.5 \mu\text{m}$ to about $2.0 \mu\text{m}$ in thickness.

22. A method in accordance with Claim 19 wherein applying a barrier coating comprises applying a barrier coating on top of the reflective metal layer to form a barrier layer of about $2.0 \mu\text{m}$ to about $10.0 \mu\text{m}$ in thickness.

23. A method in accordance with Claim 19 wherein the smoothing coating has a refractive index less than 1.5.

24. A method in accordance with Claim 19 further comprising casting an adhesive material on top of the barrier coating and filling the gaps between the scintillator pixels, the adhesive material comprising about 15 weight percent to

about 60 weight percent of a filler material comprising at least one of TiO₂, Ta₂O₅, Bi₂O₃, WO₃, PbO, HfO₂, and tungsten, the weight percent based on the total weight of the adhesive material.